Beirut to Tripoli Railway

By Bill Phippen, Australian Railway Historical Society NSW (ARHSnsw).

The Beirut (in Lebanon) to Tripoli (in Syria) Railway may seem an unusual topic for an Australian heritage magazine. The connection is however that it was built by a unit of the Australian Army, the Australian Railway Construction and Maintenance Group, (ARC&MG), led by an extraordinary engineer, Lieutenant Colonel Keith Fraser.

The Commanding Officer: Keith Aird Fraser.

The ARC&MG was led by a competent military officer with the rank of lieutenant-colonel, but he was also a man of great engineering skill with significant achievements behind him in Australia. Keith Fraser had served as a young lieutenant in the Great War in Europe, returning to Australia to become Resident Engineer on the construction of the Sydney City Railway for ten years from 1922.

Fraser held other engineering roles in the NSWGR until he was briefly responsible for the work of replacing the Hawkesbury River Bridge before war intervened in his career again. In 1943 he was demobilised to return to the bridge which was finally opened in July 1946. Fraser was sent on a study tour to the United Kingdom and America, clearly being groomed for greater roles in the NSWGR. In 1950 he became Chief Civil Engineer on the death of Albert Fewtrell, and in early 1952 Fraser became NSW Commissioner for Railways. His time in this role was brief for he died suddenly in August of the same year.

Keith Aird Fraser at his desk in Sydney c1950.
Source - ARHSnsw

The Need for a Railway

The Middle East was a bitterly fought theatre of the Second World War. Australians well know the place names Tobruk and El Alamein and of the battle against Erwin Rommel's Afrika Corps fought by Australian divisions. The important supply base for these operations was Egypt.

Syria and Lebanon (then part of French Syria) were French mandated territories between the Great Wars, and the fall of France in 1940 led Syria to ally itself with the Petain (Vichy French) government, which had made peace with Germany after it invaded France. To the north of Syria, Turkey remained neutral. The Vichy French Syrian government co-operated with Germany by opening its airfields to German forces, and allowing the passage of supplies. The Germans took advantage of this opportunity by attacking British troops in Iraq. Churchill, aware of the threat, and influenced by Free French leaders who wanted their army to invade Syria, *insisted that Wavell, then C-in-C Middle East, send a force to accompany the Free French into Syria . . . The largest formation Wavell had available for new operations was the 7th Australian Division.*[1]

The invasion of Syria started on the 8th of June. It was led by the 7th Division (complete except for its 18th Brigade which stayed in Egypt) accompanied by six battalions of Free French and part of the British Cavalry Division. The 7th Div. 21st Brigade drove up the coast, the 25th Brigade took an inland route towards Merdjayoun and Damour, and the Free French moved on the right flank, further inland towards Damascus. The fighting was memorably hard, and fast, and it was all over by the 12th July after the Vichy French sought an armistice.

The 7th Division continued its march north, up the coast, setting up garrisons along the way as far as Tripoli, where many of the 7th Div. men stayed until January 1942. With Syria occupied by Allied troops, the British wished to encourage Turkey to join the war on the Allied side, and thus needed a capability to supply them. An existing railway of differing gauges with very steep rack sections was inadequate to the task.

IMAGE at LEFT:
12th June 1941 – Near Khiam on the way to Merdjayoun in the Lebanon. Members of C Company 2/33rd Battalion (part of 25th Brigade) loading up a donkey with rations and ammunition. The donkey will take the load up the mountain to the rest of the company who were occupying a strategic position overlooking one of the mountain roads to Merdjayoun. Source: AWM 008205 – Photo by Damien Parer.

1 Mark Johnston, *The Silent 7th, An illustrated History of the 7th Australian Division 1940-46*. Pub. Allen & Unwin, 2005.

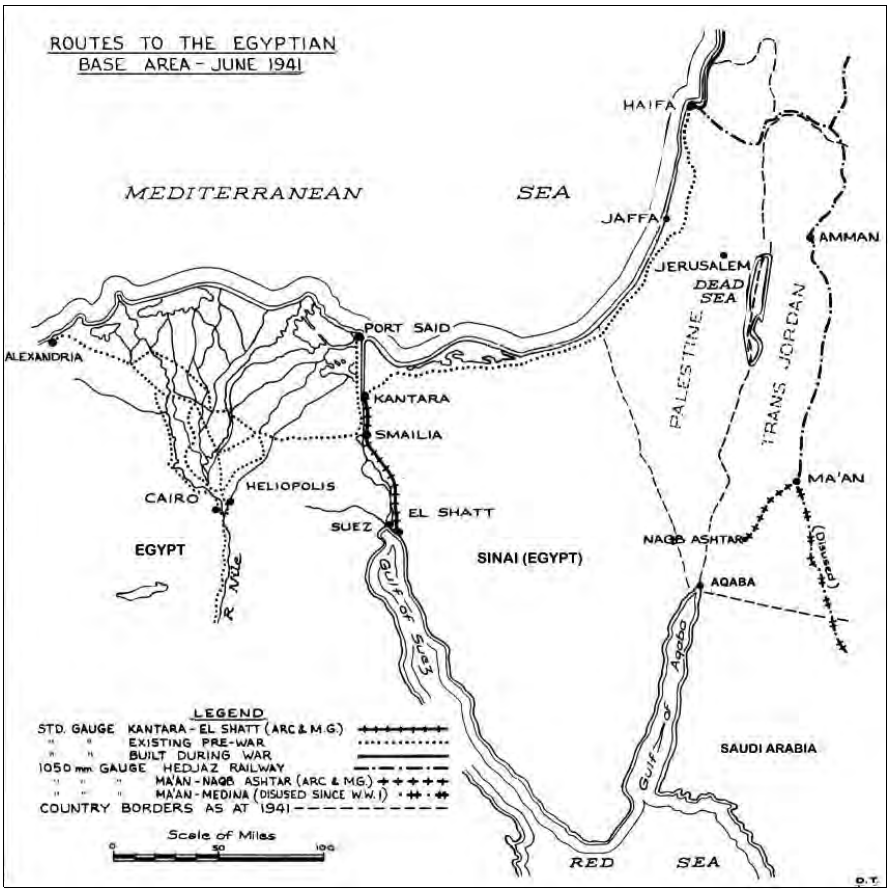
Beirut to Tripoli Railway

The decision was made to build a 213 km long, high quality, standard-gauge railway along the Mediterranean coast connecting the cities of Haifa, in Palestine and Tripoli, in Lebanon, and a significant section was allocated to the Australian Railway Construction and Maintenance Group. (ARC&MG). This unit had been formed in Australia in April 1940, with a view to operating railways behind the front in France, as had been done by Australian companies in the Great War. Before the ARC&MG could reach Europe, France had capitulated and there was no front. The unit spent some months in the United Kingdom building sidings and so on at depots and other places. The ARC&MG arrived in the Middle East in early 1941 where they built several important rail links – relatively easy tasks compared to their later work.

First ARC&MG Works in the Middle East

The Suez Canal, with its southern terminus at Suez was vital to the supply of material and men to the war, but the canal was blocked by German marine mines dropped from aircraft. Supplies came from the UK via the Cape of Good Hope and from Australia, South Africa and India through the Red Sea to Suez. To circumvent the blocked canal a standard-gauge railway was built from El Shatt, close to Suez, along the east bank to a junction with the Trans-Sinai Railway at Kantara. A railway already existed on the west bank, so this new railway was amplification and insurance. This work was relatively simple, the topography being flat, the ground sand and the 70-miles were completed in three months. One surprising design constraint was that the route could not be straight, as it could easily have been, but rather meandered unnecessarily from an engineering standpoint, to avoid the possibility of enemy aircraft flying along it to strafe and bomb.

Eighteen men who worked on the Trans Jordan Railway with the ARC&MG. The sign reads 'Ma'an to Naqb Ashtar Railway, Trans Jordan, 1st Nov 1941'.
Source - AWM P03459.003



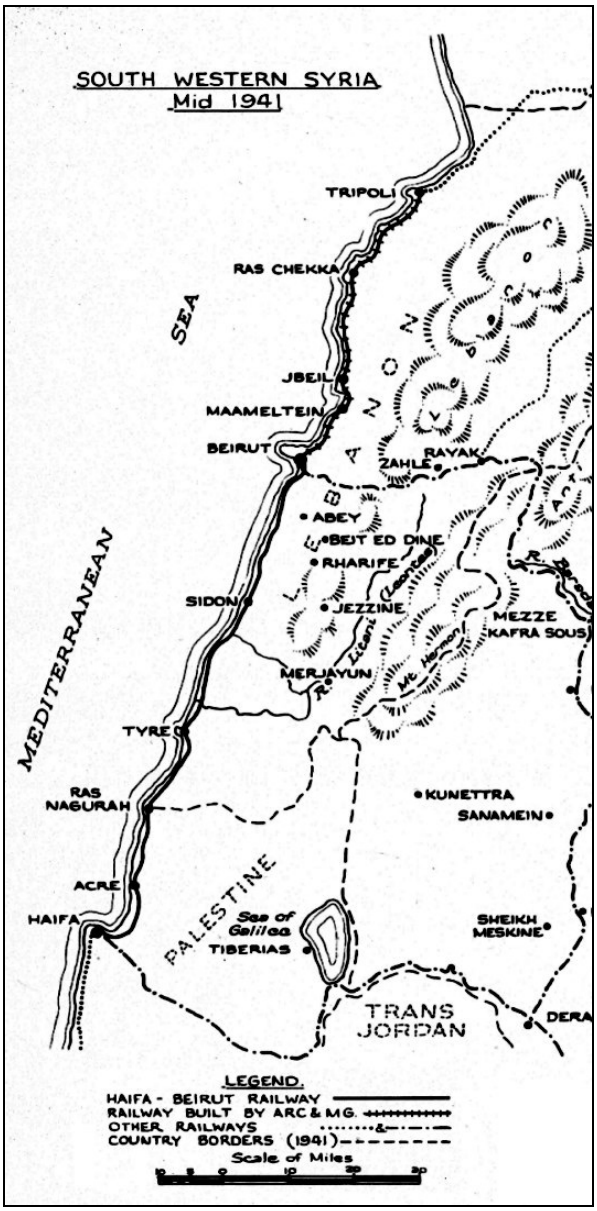
A more difficult but short line was built from Ma'an on the Hedjaz Railway, the famed target of Lawrence of Arabia in the Great War, to Naqb Ashtar in Trans-Jordan. The aim was to connect the Hedjaz railway to the port of Aqaba and thus create a second supply route to Syria. Ma'an is at an elevation of 1050m, but between there and Aqaba, only 50 km away, is the 1600m Ras en Naqb Range with a steep scarp on the Aqaba side. Building a railway down this scarp was deemed impossible in the time frame envisaged, so the Australians were asked to build a line to Naqb Ashtar above the scarp, while the steep mountain road from there to Aqaba was improved. This was no re-run of the Suez line as the ground was rugged, earthworks heavy and the rock hard.

Rail was recovered from the Hedjaz railway south of Ma'an, never restored since the destructive efforts of Lawrence. The railway was completed by February 1942, though by that stage nearly all the Australians had been withdrawn to work on the Beirut to Tripoli route.

IMAGE ABOVE: This map shows the first two railways built by the ARC&MG unit in the Middle East in 1941. These railways were the Kantara to El Shatt railway built along the Suez Canal and the Ma'an to Naqb Ashtar railway, built to improve access from the Hejaz railway to Aqaba on the Gulf of Aqaba. Haifa in Palestine at the top of the map is the starting point of the railway from Haifa north to Tripoli, via Beirut.

Source - John Knowles in the ARHSnsw Bulletin, 1978. Map drawn by David Taylor

The Haifa to Tripoli Railway – Maps

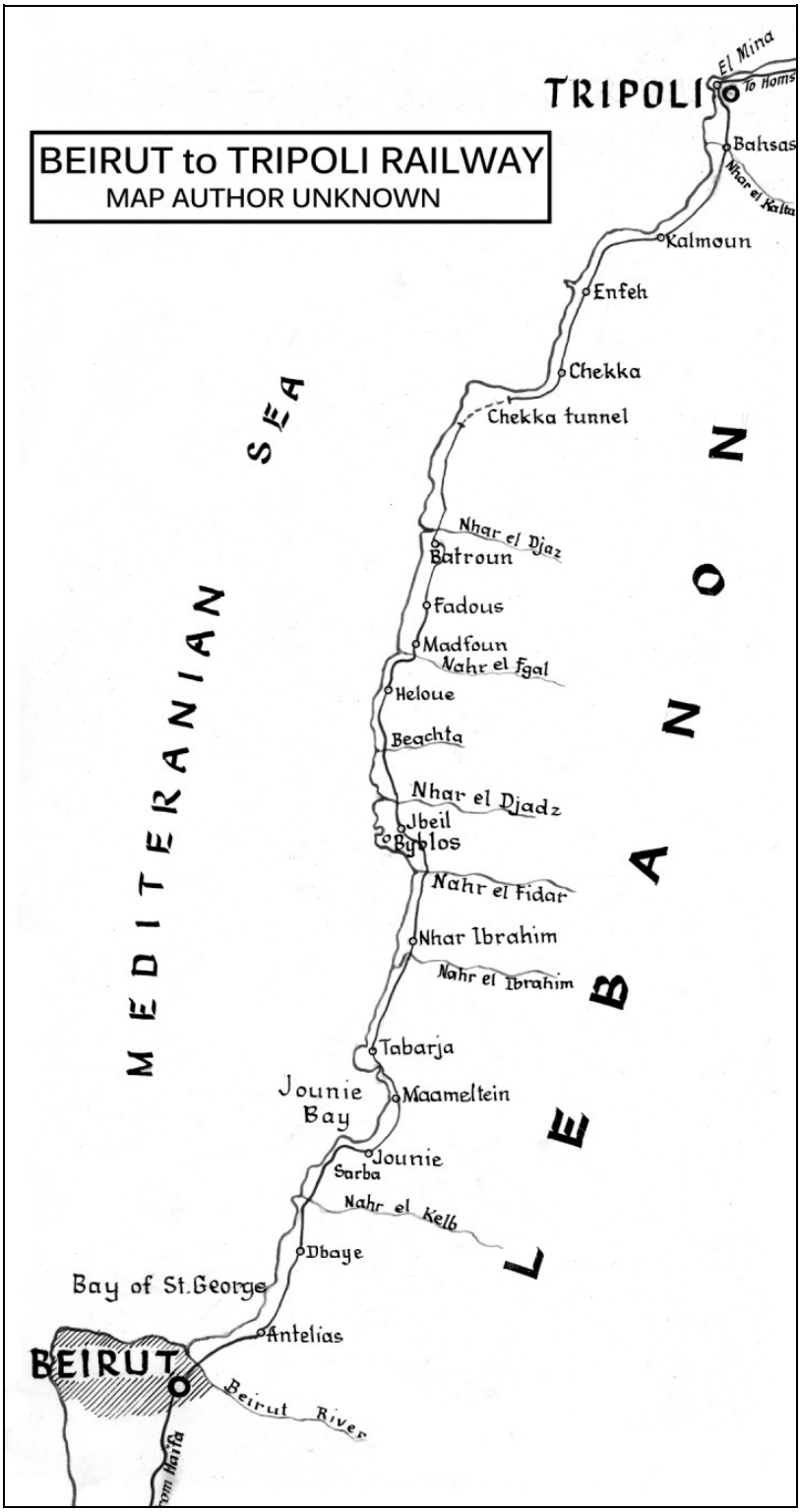


Map shows the coastal route of the Haifa to Tripoli Railway, with the Beirut to Tripoli section built by the ARC&MG unit shown with a crossed line. Extract from a map drawn by David Taylor.

A second route following the Litani Valley was surveyed, but only after the Vichy French government of Syria capitulated. It also could not be built in the time available because of the heavy earthworks in the valley, many bridges and the lack of road access.

The coastal route chosen, though longer and certainly not easy to construct, was through limestone country and had an existing road generally parallel with it. There was also some preliminary planning of the route by the French. This line would also serve Beirut, and pass the cement works at Chekka and that was a distinct advantage as much concrete was used in foundations, retaining walls and bridge piers.

Several routes were considered for the connection between the Egyptian and Syrian standard-gauge networks. The shortest of these, via the Jordan Valley to Rayak, was through hard basalt country with deep canyons, and required a descent to 700 feet (210m) below sea level and a climb to 3,300 feet (1000m) above sea level. There was little road access to the area for construction purposes and the conclusion reached was that it could never be completed in time to meet the strategic objectives driving the project.



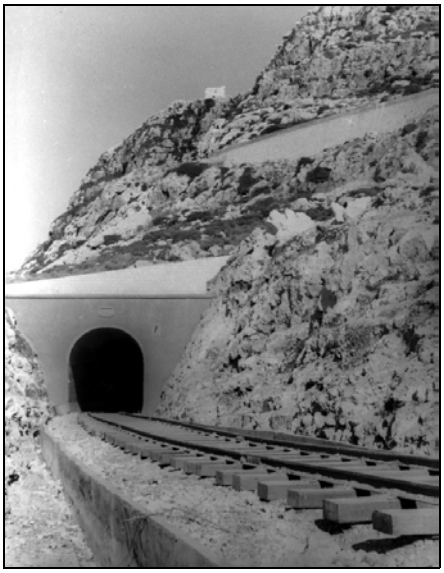
Map of the route of the Beirut to Tripoli section of the railway, showing the location of the rivers that had to be crossed with major bridges, and some of the named embankments, cuttings and tunnels. This map is adapted from a drawing held in the archives of the ARHSnsw - author unknown.

Beirut to Tripoli Railway

The Lebanese mountains come down to the sea in many places, and the streams flowing down from those mountains are substantial, especially in the wetter winter period. There would have to be large cuttings, embankments, long tunnels and high bridges.

The section of the line from Acre to chainage 137.6km, just south of Beirut, was allocated to the South African Engineering Corps and from that point to Tripoli, at 229.4km, was the allotted task of the ARC&MG. The expected duration of the project set by the British War Office was 18 months. Perhaps the major constraint was the Lebanon Range where it met the sea at Chekka headland. Even though the existing road used a tunnel, the Australian Survey Section tried for a surface route, but could not create one, so a tunnel was accepted.

Personnel for the construction, apart from the 1,000 men of ARC&MG itself, consisted of 2100 men in South African labour battalions and up to 8,000 locals – men, women and children. The South Africans were Swazis, Basutos and Bechuanas who were proud warriors, joining the army to fight, not move dirt. They liked military drill more than earthmoving, so at one stage when Fraser needed an embankment compacted he had them march at the double back and forth, achieving quite acceptable results.



The south portal of the Chekka Headland Tunnel. The tunnel was cut by South African army engineers and their men, and completed in August 1942.

photo: ARHSnsw

Beirut to Tripoli Railway – the Bridges

In the section built by the Australians there are ten bridges, all of steel girders or trusses supported on stone faced concrete piers. Foundations are on exposed rock or below scour level in gravel, placed by open caisson methods.

Because timber for formwork and scaffolding was in scarce supply, the retaining walls of abutments and the bridge piers were built with limestone blocks carefully laid as a face and this contained the concrete as it was poured. The concrete then formed the working platform for the next flight of stone facing. The local masons who did the work were skilled and committed to their trade and often incorporated different coloured stones architecturally. Of particular note is the carving into stones high on bridge piers of the Australian military insignia.

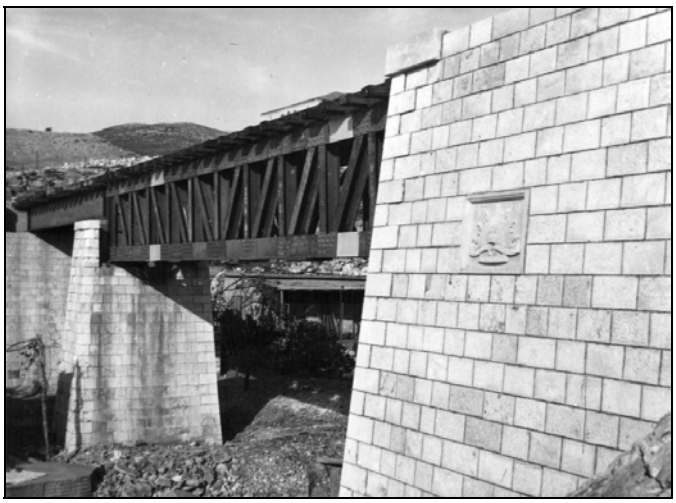
Nahr El Beirut Bridge: 3 x 100ft (30m) lattice girders, sourced from South Africa. The superstructure, with relatively low height concrete piers, was erected on falsework.

The Beirut River Bridge – photo - J.W. Knowles, 1965. The photo has been trimmed for this Magazine and a caption by Ross Gordon removed.

Maameltein Creek Bridge: IMAGE at RIGHT

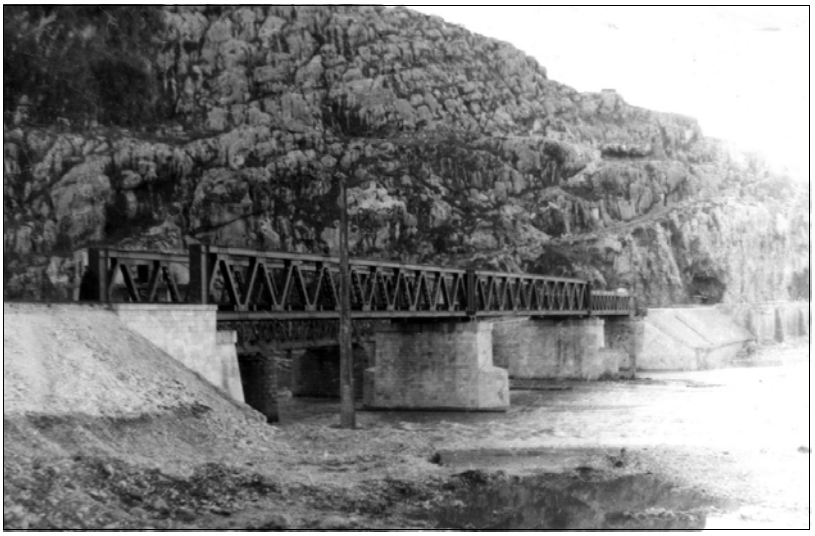
Descriptions of this bridge specify a 1 x 60ft (18m) Unit Construction Railway Bridge (UCRB) and a 1 x 36ft (11m) concrete slab, but this and other photographs suggest the smaller span is a plate web girder. A UCRB is a rivetted Pratt truss designed for ready assembly in the field to varying spans.

Note the high-quality masonry of the abutment and the elegantly carved rising sun badge of the Australian Army. The lettering on the WW2 badge says "Australian Commonwealth Military Forces".

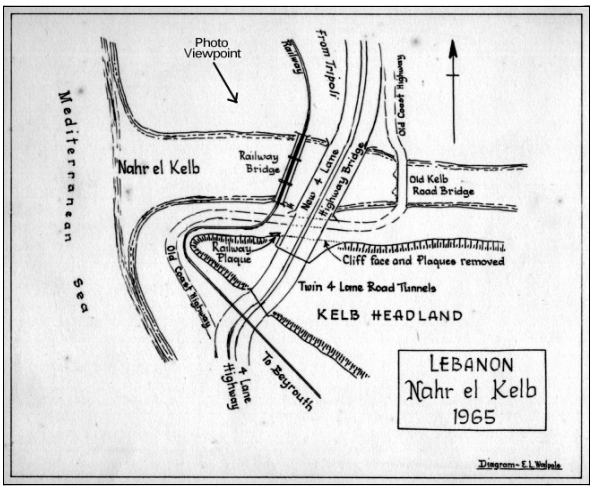


Beirut to Tripoli Railway – the Bridges

Nahr El Kelb – the Dog River Bridge: 2 x 100ft (30m) Warren Trusses, 1 x 70ft (21m) UCRB erected on falsework.



Nahr El Kelb (Dog River) Bridge shown soon after its completion. Photo E.L. Walpole.



This 1965 diagram by E.L.Walpole was drawn to show the location of the twin tunnel, 4-lane highway driven through the El Kelb headland years after the Nahr El Kelb bridge was built. The drawing has been adapted to show the viewpoint of the original photo (at left). The December 1942 opening ceremony for the railway took place close to the cliff face beyond the bridge (see later photos).

Nahr El Ibrahim Bridge:

This was intended to be 1 x 100ft (30m) lattice girder and 1 x 70ft (21m) lattice girder supplied from South Africa. The shorter span was lost at sea and a UCRB substituted. Thus, the two girders at the site do not match. Interesting also is that the bridge was assembled on falsework, which was swept away in a flood the day after the bridge became self-supporting.

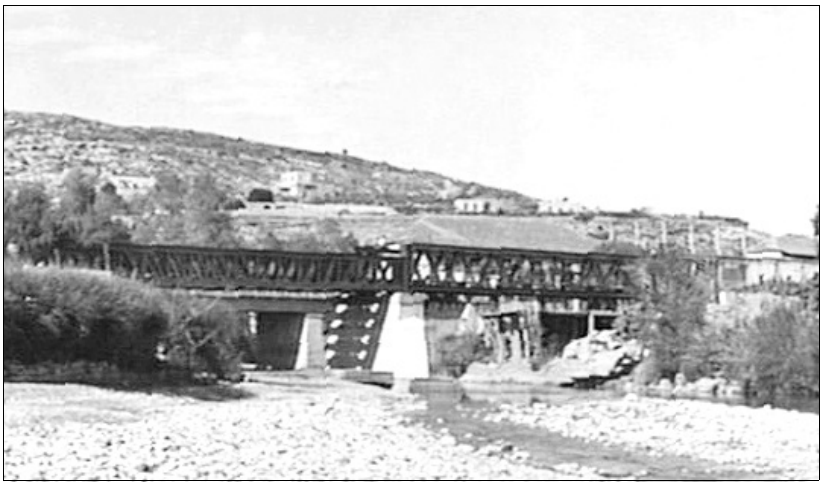


IMAGE at RIGHT:
This photo came from the Australian War Memorial, with the caption: The Lebanon. 1942-12-19. The Bridge At Nahr El Ibrahim built by the Australian Railway Construction and Maintenance Group when constructing the railway line between Beirut and Tripoli.

Nahr El Fidar Bridge:

The piers on this bridge are 62ft (19m) high, so all four spans were launched from the north approach embankment, falsework being impractical. As this was one of the later-constructed bridges on the route, all the spans were tied end to end and launched together, after the learning experience at Nahr El Djadz noted below (see next page). The bridge is comprised of 4 x 75ft (22.5m) UCRBs. It is also one of the best documented constructions in terms of photographs.

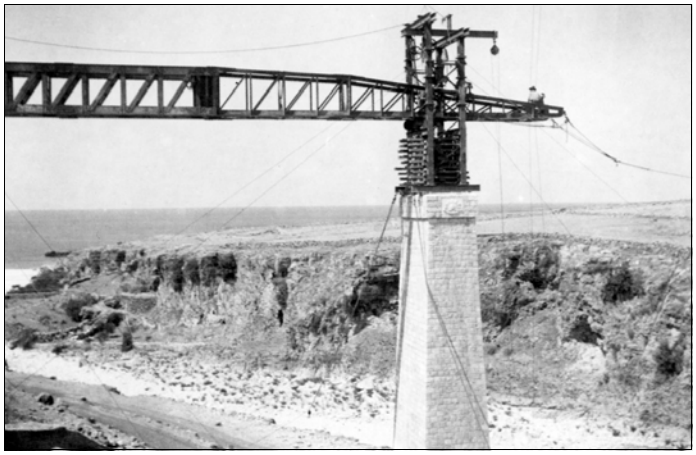
Nahr El Fidar Bridge under construction. The four spans of the bridge have reached the third pier. At the front the light launching nose extends to reach the next support (the south abutment) before too much of the weight of the girder proper has cantilevered beyond the last support. When all the spans are in place, they will be lowered to their seats on the piers and abutments, one by one.. Photo: ARHSnsw.

Beirut to Tripoli Railway – the Bridges

Nahr El Djadz (No. 1) Bridge:

This was also a high bridge comprised of 3 x 80ft (24m) UCRB and was the first erected by launching from the approach. A single span was placed, but the difficulty arose that the launching nose, projecting beyond the pier had to be dismantled in mid-air, using a flying fox. The second and third spans were launched together and thus the launching nose was on the other approach embankment when it needed to be dismantled. Subsequent bridges built by this method had all spans launched together, Like Nahr El Fidar, above.

Nahr El Djadz - Image 1: The first span on wheeled trucks is ready for pulling forward. Note the light weight launching nose and the ballast, of spare rail, at the rear to ensure that the nose reaches the next pier before the whole lot tips over. Photo: ARHSnsw

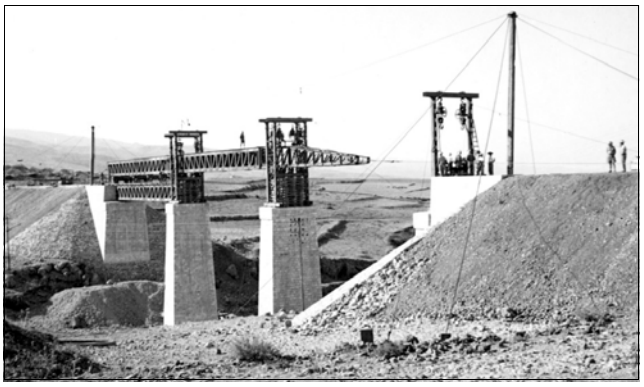


Nahr El Djadz - Image 2: The limitation of launching a single span was that the launching nose then extended out of reach. It had to be dismantled for the next use, piece by piece, high in the air using a block and tackle extending from the lowering gantry. Photo: ARHSnsw.

IMAGE at RIGHT

Nahr El Djadz Image 3: Each section of the nose was lowered before the whole assembly could be moved forward again. Note the use of the tackle on the cantilever from the lowering gantry and another tackle on a flying fox. The pier has a carved panel with the AIF badge on the east side, facing the old roadway. Photo: ARHSnsw.

Nahr El Djadz - Image 4: The nose has gone, the cribs have been removed and the first (south) span has been lowered into its final position. Photo: ARHSnsw.



Nahr El Djadz - Image 5: The second and third spans, rigidly connected as one, are launched together, wheeled across the first span and hauled by a cable attached to the launching nose. Photo: ARHSnsw. .

IMAGE at LEFT

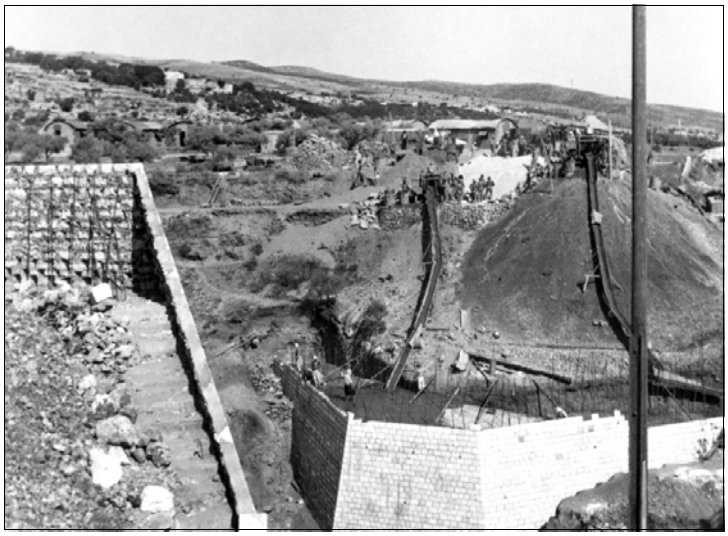
Nahr El Djadz - Image 6: The bridge completed, and carrying traffic – 3 x 80 feet spans of UCRBs. The height of the rails above ground over one of the piers was 98 feet (about 30m). The bridge is photographed from the west looking inland, with the road bridge in the background. Photo: E.L.Walpole in Eakins IEAust 1951 text.

Nahr El Djadz (No. 2) Bridge:

This bridge, further comprises 2 x 44ft (13m) deck girders, sourced from India. Knowles description of this bridge suggests that it was 'launched across trestles', but no photographs have been located to clarify what this means.

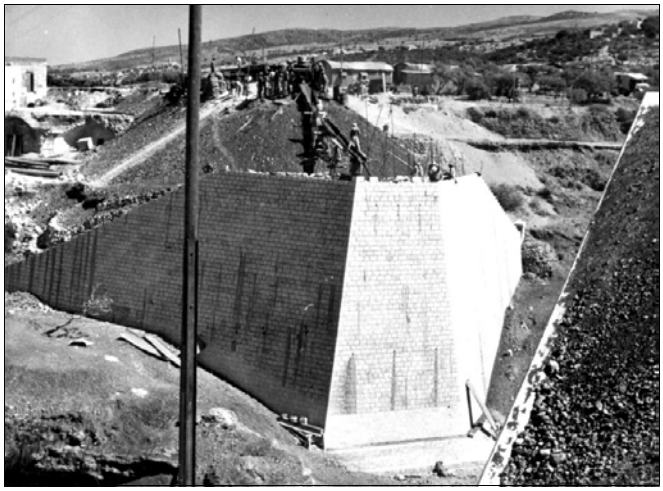
Beirut to Tripoli Railway – the Bridges

Nahr El Fgal Bridge: This high bridge, 69 ft (21m) is a single 80ft (24m) UCRB span.



Nahr El Fgal - Image 1: The massive retaining walls of the high abutments. The stone facing acts as formwork for 2,000 tons of reinforced concrete behind. The abutment at left is almost completed. Across the ravine, two mixers feed wet concrete into chutes, filling up behind the masonry.. Photo: ARHSnsw.

IMAGES: Although this bridge is much shorter than others shown here, there is a series of photos showing the sequence of construction of typical abutments.

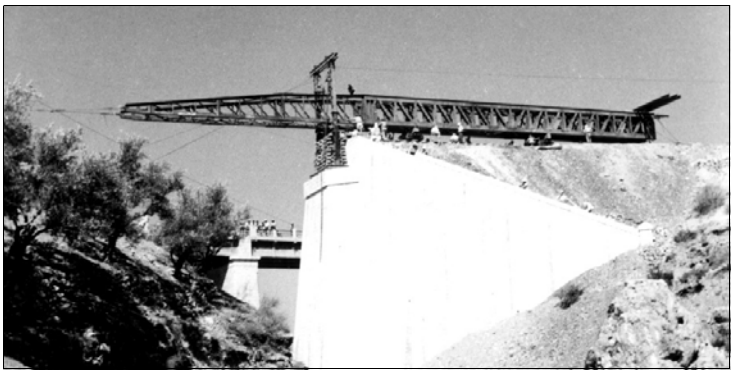


Nahr El Fgal - Image 2: The high abutment rises. Engineering design may have been Australian, but the wonderful masonry was Lebanese. One chute has been dismantled - the other is still operating. Photo: ARHSnsw

Nhar El Fgal - Image 3: The ARC&MG was well equipped - eventually. Here a bulldozer backfills behind the abutment. Photo: ARHSnsw.

Nhar El Fgal - Image 4: The stone and concrete abutments are complete. The lowering gantries and the cribs are in place. The truss is assembled on the track bed, with its launching nose, ready to launch. Photo: ARHSnsw.

Nhar El Fgal - Image 5: A mobile crane places steel rail as ballast to balance the span until the nose reaches the other abutment. Photo: ARHSnsw



Nhar El Fgal - Image 6: The launch under way. Note the towing cable to the left. Local Lebanese watch from the adjacent road bridge. Photo: ARHSnsw.

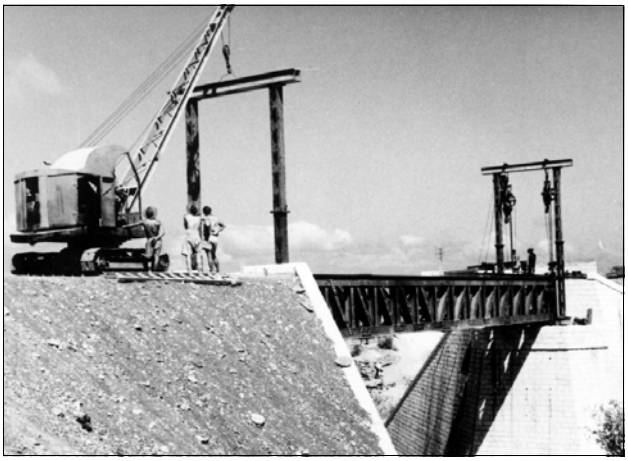


IMAGE at LEFT

Nhar El Fgal - Image 7: The UCRB has been towed across, the launching nose removed and the truss lowered into its final position. A mobile crane is removing the gantries used for lowering the truss. Photo: ARHSnsw.

There were no photographs for the other two bridges listed:

Nahr El Asfour: 1 x 40ft (12m) Plate web girder.

Nahr El Kalta: 1 x 40ft (12m) Plate web girder.

Beirut to Tripoli Railway – Tunnels

The Ras el Chekka and Ras Bayada tunnels

The Chekka Tunnel, is 4,800 feet (1.5km) long. For its construction miners were recruited, as the 61st South African Tunnelling Company, from the deep hard-rock mines of the Rand. The choice of the coastal route over the inland ones had been partly based on the rock conditions and the limestone at Chekka was perhaps close to an ideal material to work. The tunnel, which was generally self-supporting, was only concrete lined in parts, and although the South Africans mined the tunnel, the Australians lined it where required. Track through the tunnel was also part of the work of the ARC&MG. The tunnel was completed in eight months, working around-the-clock from five faces, using two adits driven in from the cliff facing the Mediterranean Sea. Excellent film (by Frank Hurley) of the tunnel work may be seen in the Australian War Memorial Archives at:
https://www.awm.gov.au/collection/C188825

A second tunnel, shorter at 900ft (270m) was also built near Chekka by the South Africans once they had finished the longer tunnel. They then returned to the Haifa – Beirut section to build a 1,000 ft (300m) tunnel to improve the route at Ras Bayada.

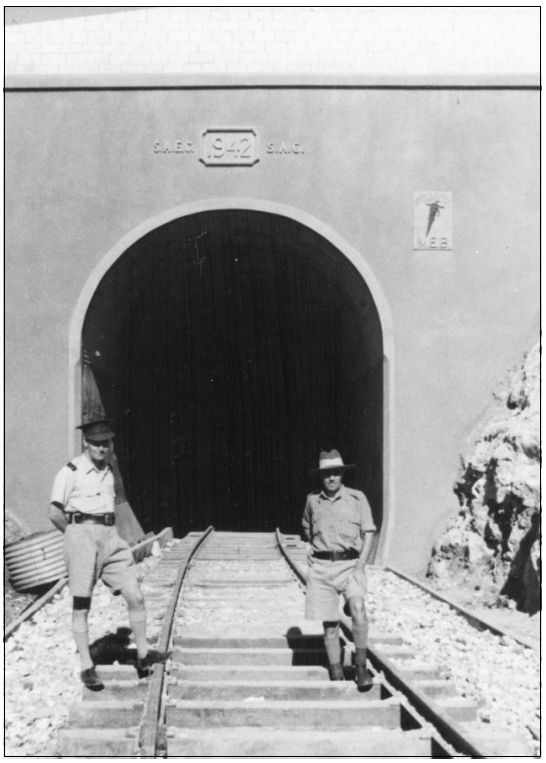


IMAGE at RIGHT
Ras El Chekka Tunnel: An Australian and a South African officer stand at the south portal of the Chekka tunnel. Photo: ARHSnsw.

Beirut to Tripoli Railway – Earthworks

Obviously, in the rugged terrain, crossing headland after headland separated by rivers in deep valleys, the earthworks were considerable. Nearly a million cubic yards (¾ million m^3) were excavated, of which about two-thirds were sand and soil and one-third rock. 40,000 cubic yards (30,000m^3) of concrete were used and 21,000 square yards (19,000m^2) of masonry walls. The largest cutting is at Maameltein where 35,000 cubic yards (27,000m^3) were moved into the adjacent fill for both the railway and a deviated road. This embankment occupied around-the-clock shifts for six months.

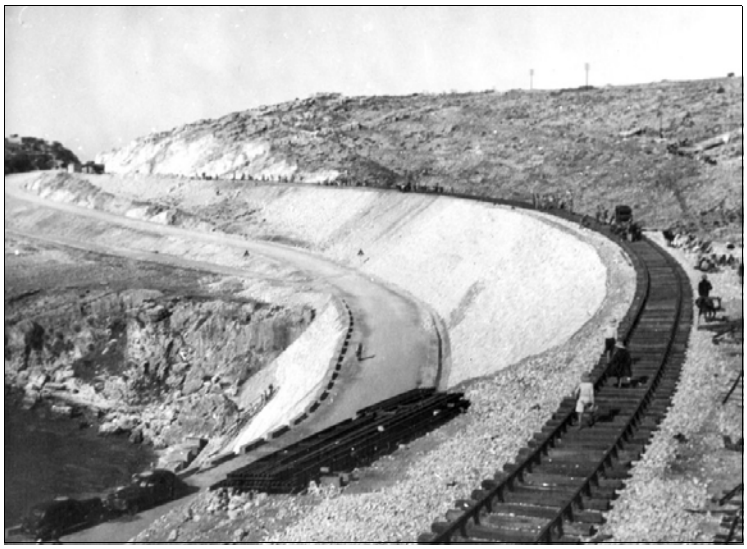


IMAGE ABOVE: The embankment at Maameltein viewed from track level. The task was made greater by the need to deviate the road. Photo: ARHSnsw.

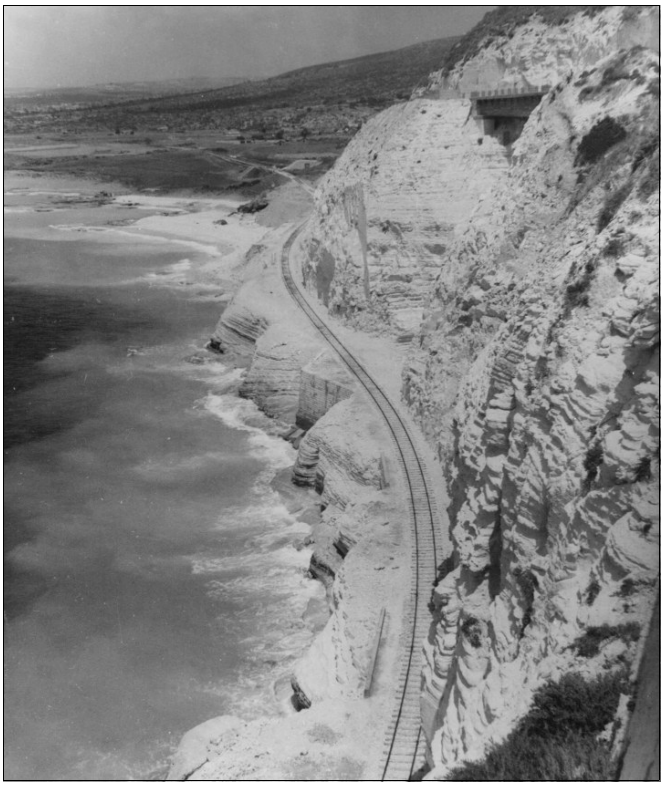


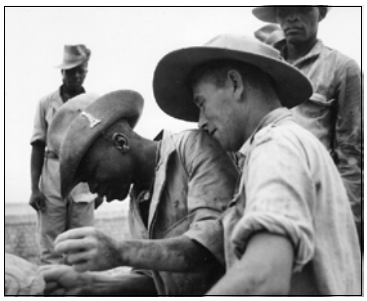
IMAGE at RIGHT: The line occupied a narrow shelf as it traversed some headlands. The road can be seen high above the railway at right. Looking from south to north, the railway extends into a valley beyond the headland, with a small bridge, seemingly under construction in the distance. Photo: ARHSnsw.

Beirut to Tripoli Railway – People

Some images of the People who built the Railway.

IMAGE ABOVE: The soldiers of the ARC&MG surveyed and managed the work. No indication of where these men are, but they are possibly above the adit to a tunnel. Photo: ARHSnsw.

IMAGE at RIGHT: A group on an abutment watching a truss of a Nahr El Fidar Bridge span being lowered with chain blocks to its final position. Photo: ARHSnsw.



2,100 South African soldiers in labour battalions worked with the Australians. Photo: ARHSnsw.

South Africans laying tracks north of Maameltein. Photo: ARHSnsw.

South Africans loading the concrete mixer with coarse aggregate supplied in baskets. This is probably the Nahr El Fgal bridge. Photo: ARHSnsw.

Carving Australian Rising Sun Plaques for bridge piers.
At right is Brother Natamuk an altar sculptor from the Maronite church at Byblos and two assistants.
Bro. Natamuk selected the stone from the nearby mountains, and our railway draughtsmen made templates for the sculptors' guidance.
The accuracy and gleaming finish of the plaques is a trubute to these Lebanese craftsmen.
The largest plaques were approx. 4 ft. x 3 ft.

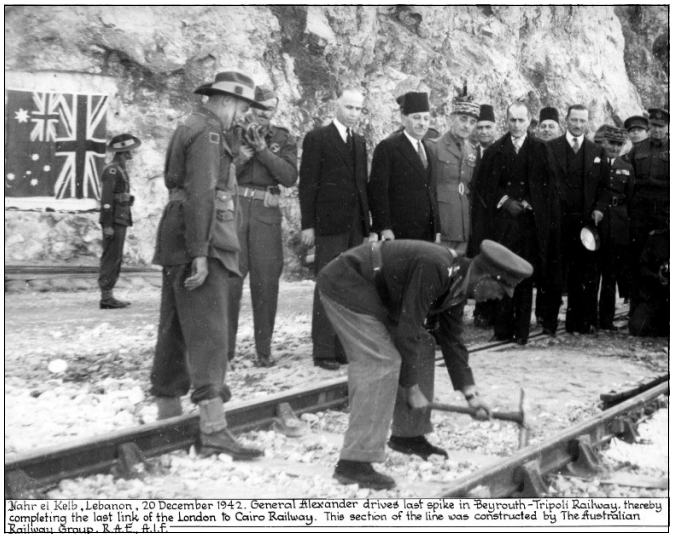
Track ballast was obtained by our machines, and local piece-work. Here, gang of Bedouin women also assist in gathering and carrying stone from adjacent olive groves, while an Arab Rias (ganger) supervises.

IMAGES - LEFT & ABOVE: The captions to these two ARHSnsw photographs were written by Ross Gordon, later Chief Civil Engineer of the NSW Railways.

Beirut to Tripoli Railway – The Opening Ceremony


With Lt.Col.K.A.Fraser, Gen. Alexander inspects guard

The line was completed six months ahead of the 18-month schedule requested by the British War Office. A large ceremony was arranged at Nahr El Kelb headland on 20 December 1942 when General Harold Alexander, the British Commander in the Middle East, drove the last spike and unveiled a plaque. This place was chosen probably because of the presence of other inscriptions nearby, including one left by Pharaoh Rameses II in 1300 BC! Other noteworthy sites on the route are St Georges Bay, the place where St George slew the dragon, and the Nahr El Ibrahim, the river which each February runs red with the blood of Adonis, though others say the colouration is from minerals in the grotto which is its source. The town of Byblos, through which the line passes has been occupied for 50 centuries. Film of the opening may be seen at:
https://www.awm.gov.au/collection/C190145


Nahr el Kelb, Lebanon, 20 December 1942. General Alexander drives last spike in Beyrouth-Tripoli Railway, thereby completing the last link of the London to Cairo Railway. This section of the line was constructed by The Australian Railway Group, R.A.E., A.I.F.

These three photographs (LEFT & ABOVE) show aspects of the formal opening ceremony on 20th December 1942. At top, General Alexander inspects the guard with Fraser behind him. With Fraser looking on, at left Alexander drives the last spike and above he questions an Australian sapper. All photos from ARHSnsw.

Recognition for Keith Fraser

For his efforts on the railways, Fraser was first Mentioned in Despatches and then in 1943 awarded an OBE (Order of the British Empire). The citation for that decoration (partly quoted below) best summarises his role.

> "During the period under review his unit has been specially employed on the Haifa-Tripoli railway project. Col. Fraser was almost solely responsible for the survey, layout and supervision of construction. His expert knowledge, initiative, resource and drive have succeeded in overcoming the inherent difficulties of the task. His handling of equipment problems, and of labour (native and civilian in addition to his own unit) has been so capably performed that he has succeeded in bringing his section of the work almost to a stage of completion in a remarkably short period. He is an officer of outstanding merit, who has carried out his duties at all times with exceptional ability and whose quiet confidence impresses all members of his own and other units."

The railway still exists but has fallen victim to the troubles in that part of the world. There are proposals from time to time to rehabilitate and re-open it.

References:

Those wishing to know more about the railway construction can access a 1951 paper by DH Eakins, re-published in the Royal Engineers Journal in 1952 – see:
https://arhsnsw.com.au/wp-content/uploads/2019/06/Royal-Engineers-Journal-June-1952.pdf
and an article by John Knowles in an ARHS Bulletin in 1978 at:
https://arhsnsw.com.au/wp-content/uploads/2019/06/Knowles-Beirut-to-Tripoli.pdf
A much more extensive album of photos than is included in either of these documents was assembled by E.R. (Ross) Gordon, who also worked on the construction, and who later went on to a career in the NSW Railways, ultimately as Chief Civil Engineer. This album, now held by ARHSnsw, is the basis of this article.

IMAGE at RIGHT: The plaque that was unveiled in 1942, photographed circa 1965. In the lettering on the plaque, Beirut is spelled in the French manner. The Carving above the text is the ARC&MG badge of a howling dingo standing on a boomerang. Photo: ARHSnsw.